

United States
Environmental Protection
Agency

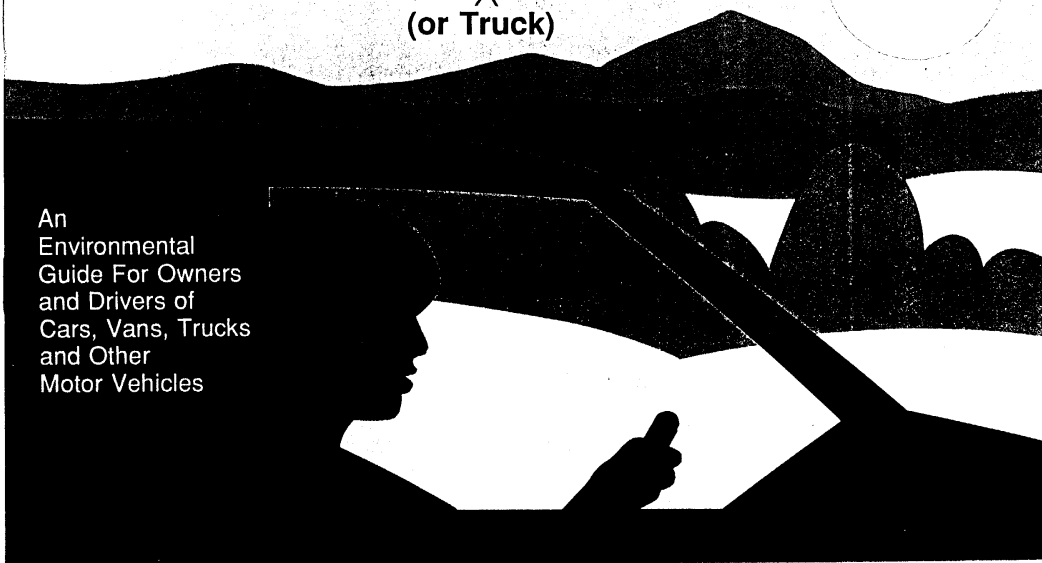
Air And Radiation
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September 1993



Your Car [^]and the Environment (or Truck)

An
Environmental
Guide For Owners
and Drivers of
Cars, Vans, Trucks
and Other
Motor Vehicles



MYTHS & Facts

MYTH: Emissions controls have a negative effect on vehicle performance.

FACT: An efficiently operating engine or vehicle will use its fuel more completely and get better performance and gas mileage. Generally, this will also result in the lowest emissions. Emission control systems are an integral part of the drive train of modern cars and trucks, which are designed to get the most performance, durability and gas mileage while still controlling emissions. Removing, disabling, or modifying emissions controls is not only illegal, but will usually result in poorer performance and gas mileage and higher emissions.

MYTH: Emission control devices have stopped air pollution from cars and trucks.

FACT: Control measures have dramatically reduced pollutant emissions per vehicle over the past 20 years, but the number of cars and trucks on the road and the miles they are driven have doubled. Vehicles are now driven two trillion miles each year in the United States. With more and more cars traveling more and more miles, growth in vehicle travel may eventually offset progress in vehicle emission controls.

FACT: Today's sophisticated emission control systems are designed to keep pollution to a minimum. But vehicles quickly become polluters when their emission controls malfunction or are tampered with. Major malfunctions can cause emissions to skyrocket.

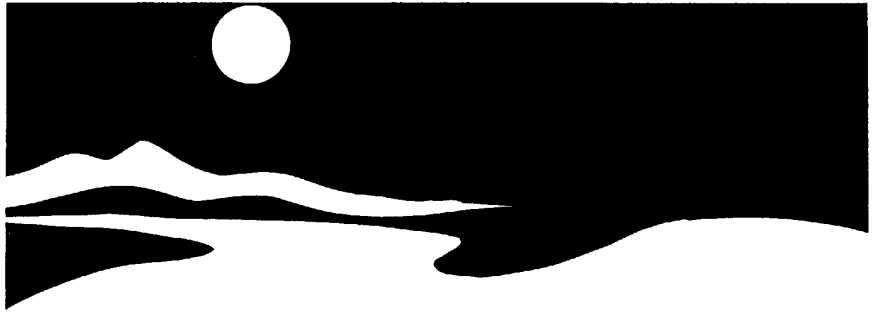
FACT: Nationwide, two-thirds of carbon monoxide (a poisonous gas) emissions and nearly half the smog-forming emissions come from mobile sources such as motor vehicles. In urban areas, at least half of the air pollutants that become smog are caused by gasoline-powered vehicles or equipment. Transportation is responsible for about one-third of the air pollutants that affect the ozone layer. Over half of the air-toxics problems associated with air pollution are attributable to emissions from mobile sources.

All Of Which Means

Motor vehicles are so much a part of society that almost everybody breathes their emissions. The size, weight, and shape of each one, the fuel it uses, the gas mileage it gets, and the way it is driven and maintained all affect the amount of energy consumed and the amount of exhaust emissions that contribute to unhealthy air, and other serious environmental problems. Put another way, the amount you drive, what you drive, how you drive, and the way your car is maintained, all can affect the amount of fuel used, and can lower the pollutant emissions of all potential sources-from the refinery to the gasoline pump nozzle to the vehicle tailpipe.

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This pamphlet was developed by the U.S. Environmental Protection Agency (EPA) in consultation with the U.S. Departments of Energy and Transportation, the Consumer Information Center of the General Services Administration, the National Institute for Automotive Service Excellence, the Automotive Training Managers Council, and the National Tire Dealers and Retreaders Association.



(or Truck) Your Car and the Environment



You and everyone who drives, repairs, or services your vehicle have an important part to play in protecting the environment. What you drive, how you drive, and how you care for your vehicle and dispose of used fluids and parts can affect the quality of the air and water, the safety and availability of landfills and other solid waste disposal systems, and the ozone layer above the earth's surface that protects all living things from ultraviolet radiation.

This pamphlet suggests ways you can help protect the environment through:

- Good driving practices.
- Proper car maintenance.
- Recycling automotive items.
- Following manufacturers' operational recommendations.
- Considering the environment when buying a car.

By so doing, you can reduce the pollutants your car produces. These common sense practices are not costly. Thus, while conserving the earth's resources, you will be conserving your own.

Talk about the following information with everyone in your household who drives, and keep the pamphlet handy (perhaps in the glove compartment) for ready reference, along with your vehicle owner's manual. That manual can be an environmentally aware driver's best friend, with its information about everything from maintenance schedules to parts specifications and numbers to warranty provisions for your vehicle's emission control system. By following the manual's recommendations, you will keep the vehicle in top operating condition, get the best possible fuel economy, and emit the least possible pollution. If you don't have an owner's manual, get one from the manufacturer or a nearby dealer.



In the Showroom

The choices you make when you purchase a vehicle can be a measure of how much you care about the environment and how "environment friendly" you and your vehicle will be. There are all sizes and shapes, big engines and small, different sizes and shapes of tires, varied fuel requirements and all kinds of options that affect mileage. So when you sort through this wide world of cars, vans, light trucks, and special purpose vehicles to determine what you need, consider these environmental factors:

Gas Mileage

A new car or truck's Environmental Protection Agency/Department of Energy fuel economy label (usually in full view on one of the windows) is an important guide to energy conservation. It tells you the estimated miles per gallon (MPG) of the vehicle under both city and highway operating conditions.

Use the label in conjunction with the annual *EPA/DOE Gas Mileage Guide* that tells you, within each vehicle class (based on interior volume, not external dimensions) the gas mileage for each car or truck. The guide will help you compare vehicles in the same class to identify those with better mileage.

Copies of this Guide are available without charge at all new car dealerships, from the Consumer Information Center, Pueblo, CO 81009, or by calling the Department of Energy, 1-800-523-2929, or the National

Technical Information Service at 1-800-553-NTIS. The information is also reported annually in *Consumer Reports* and *Kiplinger's Personal Finance*, which can be found in most local libraries. Past issues of the Guide are also available from NTIS at the above tollfree number (or write to NTIS, 5285 Port Royal Road, Springfield, VA 22161).

If you're buying a used car or truck, an economy label will not be attached, but you can check the *Guide* for the model year of the vehicle you are considering. If the engine is in good working order the *Guide* for that year is a good source of comparative information.



Fuel Efficient Shapes

There are a number of design features and options that reduce or increase drag. Check the list below and keep the pros and cons in mind when you are considering a vehicle purchase.

Design features that decrease the drag effect and fuel use:

- More streamlined front end.
- Lower vehicle height.
- Smooth wheel covers.
- Flush windows.
- Sealed openings or body design spaces
- Underbody panels.
- Optimized slope of windshield angle.

Design features that increase the amount of drag.

- Oversize outside rearview mirrors.
- Pop up headlamps.
- Brake-cooling devices.
- Roof-and trunk-mounted luggage and ski racks.
- Oversized tires.

What About Alternative Fuels?

Even though gasoline is being made cleaner than in the past, there are many alternative fuels- such as natural gas, propane, ethanol, methanol, and electricity- beginning to come onto the market that are inherently cleaner than gasoline. Each of these fuels has advantages and disadvantages relative to gasoline, but all could be made from domestic energy resources such as natural gas, coal, or farm products, thereby reducing the nation's dependence on imported oil.

Vehicles that can be converted to use such fuels might be available in your part of the country. It is not easy or cheap to convert a gasoline vehicle to use a different fuel. Such conversions should only be done by trained mechanics. In some areas, there are companies that specialize in converting gasoline cars to natural gas and propane. It is better to purchase a vehicle designed and warranted for alternative fuel use directly from the

manufacturer. By the mid-1990's there will likely be a number of alternative fuel vehicles offered for sale. Only a small number of electric cars are now being produced, but state laws, like California's, that require the use of a certain percentage of alternative fuel vehicles will boost the market for them and, hence, production.

For more information on alternative fuels, call the National Alternative Fuels hotline 1-800-423-1363.

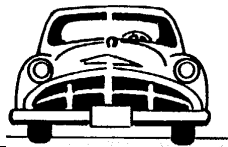
New Air-Conditioner Refrigerants

Because of the impending January 1996 ban on the manufacture of refrigerants made with environmentally unfriendly CFCs (chlorofluorocarbons), some new models are now using a different refrigerant, but most vehicles now on the market still use CFCs. See the section on maintaining car air conditioners.

When Buying a Used Vehicle

Depending upon the condition, mileage, and age of a used vehicle, you might ask a number of environment-related questions. For example: Does it meet applicable state emissions standards? And when was it last officially inspected? If it doesn't meet the required emission standards, it shouldn't be on the road unless the emissions control system is repaired, which may be costly. Does it have a valid I/M inspection?

In the 1970s, high levels of lead in the nation's air became a major health concern, especially for children. Beginning in 1974, EPA launched a major new program to phase out lead in the nation's gasoline. As a result, lead emissions have dropped by 97 percent from 1970 levels. By 1992, about 95 percent of all gasoline sold in the U.S. was lead-free, and leaded gasoline will be banned in this country beginning in 1996.



The Impact of Older Cars

According to the U.S. Department of Transportation, twenty-one percent of the cars on the road today in the United States are more than twelve years old, as compared to twelve percent in 1980. The impact of older vehicles on air and water quality, noise, fuel use, safety, and congestion is far greater than the share of travel in which they are involved. If the fleet age mix were the same today as it was in 1980, carbon monoxide emissions alone would be less than half of what they are today. Likewise, DOT says, new-car fuel economy went from 13 miles-per-gallon in the early 70s to 27.5 by the middle 80s, and this does not include the loss of fuel efficiency that occurs because of age. Retiring older cars can improve the environment, particularly in areas that are struggling to attain mandated air-quality standards.

Behind the Wheel

The environmental benefits of reducing fuel consumption are substantial. Every step in the fuel production and distribution chain represents a potential for pollution. This potential-ranging from air and water pollution to oil spills-is minimized by reducing the total amount of fuel moving through the system.

Common sense suggests that fuel-efficient cars pollute less than gas guzzlers. While there is a direct link between fuel consumption and certain vehicle emissions, the connection does not always hold true.

An increase in fuel consumption has a direct and proportional affect on the amount of carbon dioxide emissions and tends to increase some other pollutants, such as nitrogen oxides and evaporative hydrocarbons. Carbon monoxide and exhaust hydrocarbon emissions are more closely tied to how much the vehicle is driven and how well the emission controls are functioning.

Driving Habits Matter

Avoid High Speeds

Doubling a vehicle's speed, quadruples the air resistance it encounters. The average driver in the United States exceeds the speed limit on open highways by approximately five miles per hour. For every mile-per-hour over 55 mph, the average car or truck loses almost two percent in gas mileage. That means billions of gallons of gasoline are being wasted.

The Department of Transportation says if highway speeds were observed by all of us across the nation, the pollutants from about 4 million gallons of gasoline per day could be kept out of the air.

In addition, driving at high speeds causes heat build-up that accelerates tire wear because rubber deteriorates more rapidly at higher temperature.

Cornering too fast also causes excessive, uneven tread wear and a bumpy ride when tires are rotated.

Drive Smoothly

Driving smoothly saves gas *and* lowers emissions; steady speeds save money.

Accelerating slowly from a full stop takes a lot less gas. And if you gain speed slowly, you'll save as much as two miles per gallon. "Jackrabbit starts", on the other hand, use up to 50 percent more gas than easy starts.

If you have a standard transmission, shift to higher gears at the lowest possible speed; with automatics, you'll move into higher gear faster if you accelerate gently.

If your car is equipped with overdrive or cruise control, be sure to use the overdrive gear when your speed dictates. Your owner's manual will give you further information. Use cruise control if you have it.

Sudden stops and starts increase tire wear. Even in stop-and-go traffic, slow gently to a halt, and avoid "jackrabbit" starts.

Idling Wastes Fuel ... So Does Revving the Engine

Idling engines waste gas; so don't start your car until you're ready to move, and avoid long idles. Limit car warmups in winter. Stop the engine if you are going to be idling for an extended period of time such as in stalled traffic or a long line at a drive-in window.

Or, if you see a long line at a drive-in window, park the vehicle and go inside to be served.

Many old-timers think revving the engine before turning it off "cleans out the sludge," but it wastes gas and can also dump raw gas on the cylinder walls. This can increase engine wear by washing away the protective oil film. Revving can also overheat your catalytic converter, making it less effective and possibly damaging it.

Avoid Drag

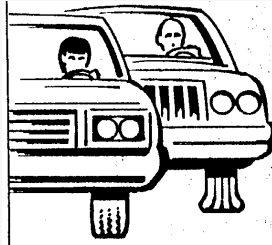
If you drive with the windows open more drag is created. Roof-mounted racks increase drag by up to 40 percent and even more if you stack luggage, bicycles or skis on the roof and back of the car. While vacation and travel needs may occasionally dictate using overhead or rear-end racks, use a removable type or, if possible, put the thing you are carrying inside the car or in the trunk. Keep in mind, however, that the weight of what you carry in your car's trunk will affect gas mileage as well. The heavier the load, the greater the drag. Every extra 100 pounds costs you about half-a-mile-per-gallon. So remove heavy items when it really isn't necessary to carry them.

Turn Air Into Oil

You can turn air into oil simply by keeping your tires properly inflated. According to the Department of Energy, Americans could save 100,000 barrels of oil a day (four million gallons of gasoline) by properly inflating their tires. How tires are used—personal driving styles, the condition of the streets and highways, the type of vehicle, and the kind of routine tire maintenance you perform—influences their life and performance. If your tires are under-inflated by just 4 pounds, it will cost you a half-mile-per-gallon.



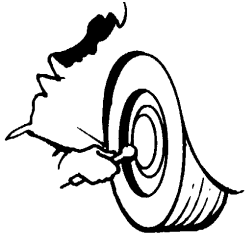
There are other benefits to maintaining your tires. *Safety* is the most important. A poorly aligned wheel or an improperly balanced, excessively worn tire can be dangerous when roads or weather are poor. And, when you properly maintain your tires, they last longer (which saves you money), thus easing the scrap tire management problem. If everyone properly maintained their tires, the number of tires disposed of in the United States would be cut by as much as half!



Maintain Proper Tire Pressure

Under-inflation shortens the life of a tire and decreases gas mileage. For every pound per square inch (psi) below the proper level, there is an average increase in fuel consumption of 0.4 percent.

The maximum pressure printed on the sidewall is not always the optimum pressure for your vehicle or driving situation. Newer cars have a label on the inside edge of the driver's door listing the recommended tire pressures for varying speeds and loads. Your owners manual may have instructions for special situations that require



different inflation. You should check the pressure on all four tires every two weeks with an accurate hand-held air pressure gauge--service station built-in air pump gauges are sometimes inaccurate.

Tire pressure changes with temperature. Check and adjust the pressure to the manufacturer-specified level when the tire is cold--when the car has been sitting for three hours or longer.

Avoid Rough Roads and Potholes

They're hard on your tires and wheel alignment. Report road problems to your local or state highway department.

Make Fewer Trips

Emissions and fuel consumption are functions of both number of miles driven and number of trips taken. This is because your car burns more gas and emits far more pollution in the first few minutes of operation, before emission controls have warmed up and reach peak efficiency. You save money and reduce pollution by making fewer trips.

Plan Your Trips

Consolidate errands and visits into a single trip. Whenever possible, drive to a central location and park, then walk to your various destinations. In other words, make the most of your time behind the wheel. Also, try to drive during off-peak, non-rush-hours so as to spend less time on the road.

Use Carpools

Consider carpooling to work or ridesharing on other trips where you are part of a group heading for the same place. Many communities and private employers provide rideshare-coordinating services. Call your local municipal transportation department or personnel department to see if such help is available to you.

Here's how carpooling cuts vehicle emissions: Suppose 100 employees of a company who normally drive 20 miles to work and back (10 miles each way) decide to commute in pairs instead of driving alone. In two weeks' time, their choice would eliminate **10,000 miles of vehicle travel**. They would save:

- * **75 pounds of hydrocarbons,**
- * **30 pounds of nitrogen oxides**
- * **550 pounds of carbon monoxide**
- * **9,900 pounds of carbon dioxide**
- * **500 gallons of gasoline**

Using Mass Transit

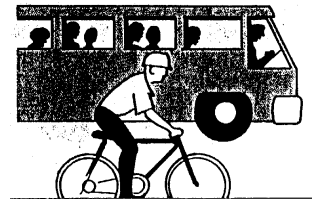
Most Americans depend on private vehicles to meet their daily transportation needs, but other options are available. You can help protect the environment by using mass transit-buses, subways, commuter rail-lines, vanpools. By so doing, you can reduce automotive emissions of air pollutants, gasoline consumption and tire wear, and overall vehicle usage.

Many people think of buses as major polluters because of their smoke and odor. This is because buses use diesel fuel, which emits more particulate matter than gasoline combustion. But a diesel bus carrying 20 passengers emits about one-tenth the hydrocarbon and carbon monoxide, one-third as much carbon dioxide, and about the same nitrogen oxide as 20 cars carrying one person each. Further, new federal particulate emissions standards which take effect over the next few years should make the smokey bus a memory.

Here are some examples of potential fuel savings (though total savings are somewhat reduced when buses, for example, run with small

loads or are dead-heading back to their garages.)

- A transit bus with as few as seven passengers uses less fuel per passenger mile than a typical car with only a driver in it. A transit bus with a full rush hour load of 44 passengers uses much less fuel than 11 cars with 4 passengers each.
- A fully loaded rail car is 15 times more energy efficient than the average car.
- Increasing mass transit ridership by 10 percent in the five largest metropolitan areas would save 135 million gallons of gasoline a year, while also reducing emissions of air pollutants.
- Boosting the occupancy of automobiles in rush



hour from one to two persons would save 40 million gallons of gasoline a day (or over 15 percent of U.S. gasoline consumption), while reducing the number of vehicles on the road.

(Source: American Public Transit Association)

Other Alternate Transportation

When possible, riding a bike or walking are the best choices of all.

When going on vacation, use chartered buses and guided tours instead of driving around on your own, and complement your driving with bicycle tours, hiking, canoeing, and self-guided walking tours.

Bicycling

This is often an inexpensive, feasible, and environmentally sound change from using a motor vehicle. All bicycle trips represent a 100 percent drop in vehicle emissions. The US Department of Transportation believes that, with adequate facilities available, bicycle commuting could rise 500 percent over current national levels—a drop of ten million drivers on the road each day.

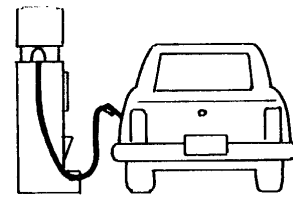
At the Pump

Gasoline Selection

A vehicle's emissions are highly dependent on the fuel it uses. Therefore it is important that you use the correct fuel for your car or truck, as recommended in your owner's manual.

Follow Manufacturer's Octane-Level Recommendations

Don't buy a higher octane gasoline than your engine needs (producing higher octane fuels uses more crude oil than the lower octane gasolines, and may often involve use of toxic substances, which means the environment suffers). Octane is not a measure of the fuel's power or quality. Using a higher octane do not necessarily increase the engine's performance, so check your owner's manual to find out what's right for your car. Although only 20 percent of today's vehicles require premium, high octane fuel accounts for 30 percent of current gasoline sales. If you do need a higher-octane fuel in your car-



generally in turbo-charged or high-performance vehicles—you will probably hear the pinging sound of engine-knock when lower octane fuel is used. Consult your owner's manual for the right grade to use.

Misfueling, or fuel switching

Misfueling is the use of leaded gasoline in a vehicle solely for unleaded fuels. Until recently it was a significant environmental concern, but as leaded gasoline becomes harder to find it is no longer common.

Avoid Releasing Gasoline Vapors

When refueling, don't overfill the tank. Stop when the pump automatically shuts off. Going beyond the pump's automatic cutoff increases the likelihood of a gasoline spill, and the release of harmful gasoline vapors.

When gasoline is pumped from a relatively cool underground tank into the warmer air above ground, its volume naturally expands. On a hot day, a vehicle filled to its limit may expel gasoline before it has been driven far enough to lower the fuel level. Spilled gasoline may damage paint or tires. (And gasoline that evaporates or spills is money that vanishes into thin air.) The same precautions against sloppy handling when refueling should be applied when you're gassing up outdoor power equipment and outboard motors.

In some parts of the country, service stations are installing vapor controls on their pumps to help reduce air pollution.

Replace the Gas Tank Cap Tightly

After refueling, put your gas-tank cap back on tightly. The cap on your tank is a part of the vehicle's evaporative emission control system and is designed to prevent the escape of gasoline vapors from the fuel tank. If yours is lost or damaged, replace it as

soon as possible with an identical one. This is also a safety precaution that can prevent a damaged fuel tank and keep water out of your fuel. In addition, evaporating gasoline due to loose or missing caps will boost air pollution.

Cleaner Fuels for Cleaner Air

The demand for cleaner air led to a search for fuels that pollute less than today's gasolines. Such alternative fuels can reduce motor vehicle pollution because they burn more completely or are less likely to evaporate directly into the air. These fuels also reduce the nation's dependence on foreign oil and are generally safer than gasoline. New fuels are beginning to appear at public pumps in certain parts of the country, and some manufacturers are producing cars that can use gasoline, alternative fuels or combinations of both. Check your owner's manual-manufacturer recommendations vary by make, model and year.

- **Cleaner Gasolines**-The petroleum industry has responded to the requirements of the Clean Air Act by

developing cleaner-burning and less volatile gasoline formulations.

Oxygenated gasoline contains additives such as alcohol or alcohol derivatives to increase oxygen content. Sale of oxygenated gasoline, or "oxyfuels", is required in the wintertime in parts of the country with unhealthy levels of carbon monoxide pollution.

Reformulated gasoline will be required beginning in 1995 in areas where ozone (smog) levels exceed health standards. Reformulated gasoline differs from conventional gasoline in its lower volatility and reduced toxics content, but higher oxygen content.

- **Alcohols-Ethanol and Methanol** are liquid fuels that can be used in pure form or blended with gasoline. "E85" and "M85" contain 15 percent gasoline and 85 percent ethanol or methanol and are already being marketed at some filling stations. All major manufacturers have developed so-called "flexible fuel" or "variable fuel" vehicles capable of running on gasoline, E85 or M85 or a combination of the two. Vehicles that burn pure alcohol emit less pollution

than those that run on E85 or M85 blends, and vehicles that run on blends are somewhat cleaner than gasoline vehicles. Additional design modifications to gasoline engines are necessary to enable vehicles to operate properly on pure alcohol.

- **Gaseous Fuels--Compressed natural gas and propane** have been used as automotive fuels for years in many parts of the world. These cheap, clean-burning fuels are beginning to gain favor in the United States as alternatives to gasoline. Because the tanks that contain the gas are heavy and bulky, such fuels are more frequently used for larger vehicles that can accommodate the extra space and weight, and for fleet vehicles that can be refueled overnight at a central location.

- **Electric Cars**—In the not too distant future, motorists will be able to drive up to a "charging station" to refuel their vehicles with electricity. At least one manufacturer has been approved by the state of California to manufacture and sell electric cars, which under that

state's laws, must be generally available beginning in 1998. Vehicles powered only by electricity emit no pollution, though the power plants that produce electricity to charge the batteries do pollute. Manufacturers are working hard to develop electric cars that will be attractive to consumers, although at present they do not provide the range or performance of gasoline-powered vehicles nor the production level to meet a market demand.

Motor Oils and Gas Mileage

Your choice of engine oil can affect gas mileage.

Viscosity is Important

Your owner's manual provides a variety of engine oil viscosity (thickness) recommendations based on the lowest outdoor temperatures expected for the period the oil is in the engine. The viscosity level of the oil you are buying will be marked on the container with numbers such as "10 W 40" or "5 W 30." The lowest viscosity recom-

mended by the owner's manual is your best bet for gas mileage, easy starts, and cold-engine protection. If you don't have a manual, check with a dealer, the manufacturer, or the National Institute for Automotive Service Excellence.

Energy Conserving Oils

Energy conserving oils are now on the market. Look for the "energy conserving" oil labeled with "EC" numbers on the container. By using them you can improve your gas mileage by one to two percent.

Don't Use Too Much Oil

Don't overfill the crankcase. Extra oil can increase friction in the engine, and the excess oil is rapidly consumed or wasted, often creating a mess in the engine compartment. If you or the gas station attendant check the oil level and find it's a half-quart low, only put in a half-quart, or wait until it's a quart low, and then put in a full quart. Oil is now sold in plastic, resealable containers, often with gradations on the side allowing measured, controlled pouring.

In the Shop

[See the inside back cover for tips on finding a good automotive repair shop.]

Proper maintenance helps keep your car's engine and emission control system working efficiently and effectively. Well-functioning vehicles pollute less-and deliver the added benefits of increased fuel economy, better performance, longer life, and higher resale value.

Proper maintenance used to revolve around regular tune-ups, during which the carburetor was adjusted and parts were replaced. It is still very important to follow manufacturer's scheduled maintenance recommendations for today's sophisticated, fuel-injected vehicles. But if a modern car generates high emissions, it is usually due to a malfunction which needs to be fixed, such as a broken sensor. It takes the diagnostic know-how of a skilled technician to find and correct such malfunctions.

Follow manufacturer recommended maintenance guidelines

The owner's manual provides recommended maintenance intervals and product specifications for your car. The manufacturer's warranty on the emission control system is also explained here.

Whether you do the work yourself or have a professional automotive technician do it, make sure the manufacturer's specifications on parts and service are followed. Following the manufacturer's recommended maintenance guidelines helps identify malfunctioning parts before they cause noticeable or serious damage. For example, dragging brakes and faulty transmissions can be detected during a routine maintenance check. These malfunctions may affect fuel economy and emissions before they create driveability problems.

Get regular maintenance checks

Every car has some items that need to be checked on a regular basis and others that need to be replaced periodically. These include air filter, vacuum and coolant hoses, oil, oil filter, other fluids, belts, and so on. Oxygen sensors should be checked regularly for performance after 50,000 miles and replaced if there is any doubt. Spark plugs should be examined periodically; malfunctioning plugs can damage the oxygen sensor and catalytic converter. Your owner's manual will tell which parts need to be changed or checked and when.

Vehicles driven under severe conditions much of the time (stop-and-go driving, travel on dirt roads, etc.) may need more frequent oil and filter changes than recommendations indicate. Again, your owner's manual provides guidance.

Finally, it is important to get your engine and emissions system checked

promptly whenever you notice a change in the way your car functions, if fuel economy seems to drop, if a warning light goes on, or if your car fails an emissions test. Delay can worsen the damage. Finding the source of a problem in a modern vehicle can be complicated, so you may have to pay a diagnostic fee in advance.

Change the oil regularly

Most motor oils on the market today carry an energy conservation or "EC" label, indicating they improve fuel economy by reducing engine friction. Always follow manufacturer recom-

Do not mix used oil with other substances. Don't dump it into a sewer or onto the ground where it can contaminate municipal wastewater or underground water supplies.

mendations in choosing motor oil for your car.

When adding oil, don't overfill the crankcase. Extra oil is consumed more rapidly than necessary.

Fuel Injection Systems

A significant percentage of all vehicles in use today, including almost all new passenger cars and light-duty trucks, have fuel injection systems. These systems should be checked during tune-ups. If fuel injectors become fouled as a result of deposit buildups, fuel economy suffers, the vehicle is harder to start and drive, and pollutant emissions are significantly increased. If badly clogged, the injectors may have to be cleaned or replaced.

Fortunately, almost all gasolines sold today contain additives to control fuel injector deposits. Ask your service station manager if the gasoline contains such additives (or call the company's area distributor).

Emission Controls

Vehicle emission inspection programs have been mandated by the federal government and have been established in more than a hundred cities and counties across the United States, and will spread to more areas as new clean air programs are adopted. These programs are designed to ensure that polluting vehicles are identified and repaired. Such repairs can improve fuel economy by 6 to 7 percent. If there is no inspection program where you live, have a mechanic do a visual check of the emission control devices to make sure they are in place and properly connected.

Tampering with your emissions controls or misfueling-using leaded gas instead of non-leaded-can increase pollutant emissions by as much as 800 percent! And tampering and misfueling are violations of state and federal laws.

Don't tamper with these controls. "Tampering" includes removing, disabling, or making inoperative any motor-vehicle emission-control device or element of design. Since today's vehicles are designed with emission controls as an integral part of the entire power-train system, tampering with these devices not only increases emissions but also reduces overall vehicle performance and durability.

Replacing the Catalytic Converter

If you have had all the proper maintenance performed and your vehicle still fails an emissions test, have the catalytic converter checked. Occasionally, the converter may need to be replaced so a vehicle can pass the test. Before undertaking this major repair, be sure to get a thorough diagnosis of the engine and emission system, perhaps even a second opinion, because catalysts rarely "go bad" by themselves; a problem in the catalyst is usually the result of a problem upstream in the engine management system. If it must be replaced because it

is missing or is no longer functioning correctly, make certain the replacement's label shows that it meets EPA requirements and is warranted to meet federal durability and performance standards. All manufacturers of new and rebuilt converters who meet the EPA requirements must state that fact in writing, usually in the warranty information in their catalogs. If you or a mechanic bypass a damaged or ineffective catalytic converter instead of replacing it or repairing it, you are breaking the law-the penalty could be much higher than the price of a new or rebuilt unit.

Converter repair might be covered by your warranty and you could be entitled to free repairs. The converter on a new car should last at least 50,000 miles. New EPA regulations will increase the mandatory life to 80,000 miles in 1994 and will require that 1994 model year cars and light trucks have on-board diagnostic computers that monitor the operation of emissions control systems. Information on malfunctions will be stored in a

memory bank accessible by technicians. Because many problems with the emissions control system do not affect a vehicle's performance, drivers may not be aware of the problem (unless, of course, the vehicle fails an emissions test). When the computer identifies a problem, it will alert the driver via a dashboard light.

Emissions Control Warranties

The Emissions Warranties might cover problems that would cause a vehicle to fail an inspection and maintenance test for a period of up to five years, if the vehicle has been properly maintained. The emissions defect warranty covers major emission control components on current models for five years or 50,000 miles. It covers the catalytic converter, oxygen sensor, and onboard diagnostic system. Future models will be warranted for longer periods, beginning in 1994. Your owner's manual tells you what parts are specifically covered and for what length of time. Contact your dealer or manufacturer for further information.

Our Threatened Ozone Layer (The Good Ozone)

Unlike ground-level ozone, which is a noxious pollutant, the stratospheric ozone layer miles above the earth shields us from harmful ultraviolet (UVB) radiation that can cause skin cancer, cataracts, and damage to the body's immune system. It can also damage crop and marine ecosystems. Chlorofluorocarbon-12 (CFC-12), also known by the trade name "Freon," is used as a refrigerant in all but the newest vehicle air conditioners. CFCs deplete the ozone layer if they are released into the air when car or truck air conditioners are serviced, or when the vehicle is scrapped or salvaged. When they reach the stratosphere, the CFC molecules break apart, releasing chlorine, which attacks the ozone layer. A single chlorine atom can destroy several thousand ozone molecules.

The United States and 75 other countries have agreed to halt production of ozone-depleting chemicals by January 1, 1996. The 1990 Amendments to the Clean Air Act also ban non-essential uses and mandate recycling, labeling products made with or containing ozone-depleting compounds, and evaluating the safety of new alternative chemicals.

Vehicle Air Conditioners

Much of the ozone damage caused by mobile air-conditioner refrigerants can be prevented if service shops recycle the refrigerant instead of releasing it into the air, and if it is removed for recycling before a vehicle is scrapped or abandoned. Federal regulations require motor vehicle air conditioning repair shops to have a machine that pulls the refrigerant from the air conditioner into a holding tank. The refrigerant is filtered so that it becomes clean enough for reuse in automobile air conditioners.

Ask your service shop operator to show you the seal of approval on the capture or recycling machine. Certification by a qualified testing laboratory, like Underwriters Laboratories, means the recycled refrigerant placed back in your car or truck by a properly maintained and operated recycling machine meets industry standards. These standards resulted from strict tests performed by the automotive industry and the EPA.

Refrigerant recycled by approved machines does not affect your new car warranty.

A Note for Do-It-Yourselfers

Don't try to replenish refrigerant that leaks out of your vehicle's air conditioner by yourself. Professional service has important benefits. You will avoid improperly charging your system; lack of proper service can result in poor cooling and can damage your vehicle's air conditioning system. And, since November 15, 1992 only certified mechanics can legally purchase the small cans of CFC needed to refill vehicle air conditioning units. Dealers who sell the small cans to individuals can be prosecuted. In the long run, having a professional add refrigerant to your air conditioner could save you money by helping you avoid costly repairs later on. For more information call EPA's Stratospheric Ozone hotline: 1-800-296-1996.

Repair It, Don't Refill It!

Do not ask your mechanic to refill a leaking system. Merely refilling a leaking system is a big waste of money. Repair of your leaking air conditioner protects the environment.

Since recycling requires special equipment and may take a little extra time, some costs of servicing car or truck air conditioners may rise. But by recycling, you will need less new CFC, so replacement refrigerant costs will be reduced. The overall cost of servicing your car will depend on local circumstances.

"Greener" Refrigerants

Some automobile manufacturers have designed air conditioners that use a refrigerant called HFC-134a instead of CFCs. They are believed to be less harmful to the environment. Drivers of cars with the new air conditioners probably won't notice any difference in the cooling effect, but the new refrigerant is not interchangeable with the old. If you own a car that uses the new

refrigerant, you'll need to have it serviced by your dealer or find a service shop that can handle it. Owners of vehicles using the old refrigerant may find their cars harder and costlier to service as the supply of CFC-based refrigerants diminishes. It may make sense to have your air conditioner modified to accept HFC-134a if it requires major service anyway. Manufacturers are developing guidelines that will let older systems be switched to the new product.

Cooling Systems and Coolant

Many vehicle owners tend to ignore the engine's cooling system except to check the coolant as winter nears, or if there seems to be a leak in the water pump or radiator. What you should do is have the system flushed and refilled every two years. At the same time, the system can be checked for leaks that could let chemicals in the coolant evaporate into the air or reach the ground. It is also wise to have the coolant level checked before going on long trips or at the start of each winter or summer season.

Tires

Not only does the condition of your tires affect gas mileage, tires-used ones-are a major form of solid waste that helps to clog the municipal waste stream and the dwindling number of landfills around the country. By purchasing the proper tires for your vehicle and maintaining them well, you will maximize their useful life. Tires that have only a 40,000 mile warranty might last 80,000 or 100,000 miles if properly maintained.

Rotate your tires every 5,000 miles, since tires do not wear evenly on all four wheels. On rear-wheel-drive cars, the back tires generally wear 30 to 100 percent faster than those on the front. On front or four-wheel drive vehicles, the front tires usually wear faster. Also, rear tires on small, light front-wheel drive cars have a tendency to wear unevenly, which, in turn, produces a bumpy ride.

Improperly aligned wheels can increase tire wear tenfold. Tires should be balanced and wheel alignment checked when the tires are rotated. If

you frequently drive on rough roads, have your alignment checked more often than every 5,000 miles. At high speeds, an out-of-balance tire can result in irregular tread wear.

Inspect your tires periodically for signs of wear. When the tread is worn down to one-sixteenth of an inch, builtin "wear bars" will appear. They look like narrow strips of smooth rubber across the tread. If you see them, the tires are worn out and it's time to replace them to reduce the chance of accidents and prevent further damage.

Replacing tires

You don't have to replace all your tires at the same time so long as the worn ones are replaced with the same type. When tires need to be replaced, don't guess which tire is right for your vehicle-look at the tire placard that comes with the vehicle or check the owner's manual. It tells you the size of the tires which were the vehicle's original equipment. Tires should be replaced with the same size, or

approved options, as recommended by the automobile or tire manufacturer.

Never choose a smaller size, with a lower load-carrying capacity than the size on the tire placard. Always mount tires of the same size and construction on the same axle. If you wish to replace a tire with a different size and/or construction, check your vehicle owner's manual for the manufacturer's recommendation.

If your vehicle was equipped with speed-rated tires, consult the owner's manual for proper size and speed rating. If the manual specifies speed-rated tires, the replacement tires must have the same or higher speed rating to maintain safe speed capability.

Fill Out Your Tire Registration Form

When buying new tires, be sure your name, address and tire identification number (DOT code) are recorded and returned to the tire manufacturer or its designated record-keeper. Tire registration enables the manufacturer to notify you in the event of a recall.

All Tires Are Not The Same

There are three types of tires: **Bias** tires are the least expensive but have the shortest expected life. **Belted bias** tires last longer and are slightly more expensive. **Radials** are the most expensive, but have the longest mileage guarantee. They also improve car handling and reduce gasoline consumption by 5 to 10 percent. (Note: using a combination of different kinds of tires reduces a car's handling ability, so avoid doing so except in an emergency.)

Tires are sized by diameter and width and are rated by their weight-carrying capacity. A tire that is too small for a vehicle can end up carrying too much weight and wear out faster. Overloading a tire by as little as 10 percent will significantly decrease its life expectancy. Tire information is located on the tire sidewall and usually looks something like those on the accompanying illustration. The numbers and letters refer to the tire's tread width, speed rating, type (radial or bias), and diameter, etc. The adjoining chart shows you how to 'read' your tires.

Sidewall Savvy

"H" is a speed rating. When replacing tires, all should have the same speed rating as well as same size and construction. Other ratings are S, T, U, V, and Z. "S" is the slowest rating at 112 mph and "Z" is the fastest at over 149 mph.

"R" is for radial. Can also be "B" for belted bias or "D" for diagonal bias.

Diameter of wheel in inches. Service description (used on some tires instead of showing the speed rating description) is load index and speed symbol.

Ratio of height to width.

"205" indicates the width of the tire in millimeters.

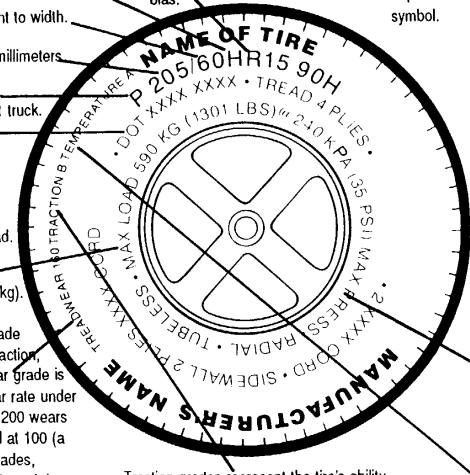
"P" stands for passenger. Can also be "LT" for light truck.

"DOT" certifies compliance with Department of Transportation safety standards. The numbers after it are the tire's serial number. Following that are the type of cord and number of plies in the side wall and under the tread.

Maximum load is shown in pounds (lbs) and kilograms (kg).

The DOT requires manufacturers to grade passenger tires based on treadwear, traction, and temperature resistance. Treadwear grade is a comparative rating based on the wear rate under controlled conditions. A tire graded at 200 wears twice as long in the test as one graded at 100 (a typical 20,000 mile tire). Treadwear grades, however, should not be linked with projected tire mileage. Performance depends on actual conditions, maintenance, and driving practices.

Traction grades represent the tire's ability to stop on wet pavement in tests. "A" is the best rating and "C" is the lowest.



Retreads

When buying tires, consider retreads. The retreading process has been improved since the days when retreads were poorly regarded. Those strips or chunks of retreaded rubber you see scattered along roadsides are most often due to poor maintenance, rather than to a faulty retreaded tire. Both virgin and retreaded tires end up on the side of the road or in scrap piles if they aren't maintained properly. Although most major tire retail chains sell retreads only for trucks and industrial vehicles, retreads for passenger vehicles are usually available if you ask for them.

As soon as you buy your retreaded or new tires, begin a maintenance program for them. Remember, you can often get twice as many miles out of your tires with the proper maintenance.

Maximum pressure is in pound/square inch (PSI) and kilopascals (Kpa).

Temperature grades are also rated "A" to "C," with A being the highest and C the lowest. They indicate the tire's resistance to the generation of heat in tests.

Recycling Parts & Fluids

Pollution *prevention*, as compared to dealing with environmental problems after-the-fact, is an important aspect of effective environmental protection. Recycling old tires, used oil and oil filters, vehicle refrigerants, worn-out batteries, and other parts of vehicles that are no longer road-worthy is an important part of pollution prevention. By so doing, you keep potentially dangerous pollutants out of sewers, wastewater treatment plants, underground water supply sources, and precious landfill space. You will be protecting the health of children, pets and farm animals. Here's how vehicle-owners can help keep their environment clean and safe through pollution prevention:

Disposing of Used Tires

When it comes time for you to replace your tires, keep in mind that they may still be useful—don't just throw them away!

If your old tires are still in good

condition (other than being worn), they can be retreaded. Retreading is, of course, a form of recycling. Look in your telephone directory Yellow Pages, under "tires-used," "tire recapping," "tire retreading," or "tire repairing," for information about where to take them.

If the tires are not retreadable, they can be turned in to the tire dealer where you purchase your new tires or retreads if the dealer has a responsible scrap-tire disposal policy. There are 41 states that regulate scrap tire management, but sometimes the regulations only apply to large dealers, so you'll have to check that, too.

But if you can't find a dealer to take them, call your local solid-waste-management and sanitation department for disposal instructions. In any event, don't toss them into the nearest dumpster or ditch; see that they are properly disposed of.

Potential uses for tires that can't be retreaded include use as fuel, as an

ingredient for asphalt, in various civil engineering applications, and as an ingredient for new product.

The Scrap Tire Problem

As the number of vehicles in this country increases, so does the number of tires. Billions of tires have been stockpiled, dumped illegally, or buried in dwindling landfill space all across the country and more are added every day. Over 242 million tires are scrapped in the United States every year—about one tire per person! Only about 30 percent are reused, recycled, or recovered in environmentally and economically useful ways. The rest are either landfilled or added to rapidly growing stockpiles.



Recycling Used Oil

The oil from just one oil change is enough to contaminate a million gallon of fresh water.

Americans who change their own oil throw away 120 million gallons of recoverable motor oil every year, and it often contains such toxicants as lead and benzene in unsafe concentrations. If that oil is dumped on the ground, it can leach into underground drinking water sources.

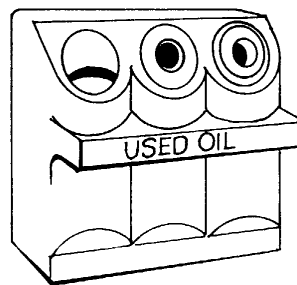
Only one gallon of used oil yields the same 2.5 quarts of lubricating oil provided by 42 gallons of crude. If the oil thrown away each year were recycled, it would markedly reduce the need for imported or domestically drilled crude oil.

If your community has an oil recycling program, join it. If it doesn't, start one. To get a copy of EPA's manual, "How to Set Up a Local Program to Recycle Used Oil", write to the Resource Conservation and

Recovery Act Hotline, 1725 Jefferson Davis Highway, Arlington VA 22202, or call 1-800-424-9346.

If You Change Your Own Oil

Recycle the used oil by taking it to a service station or another facility that offers collection services. Call your state or local used oil program for locations of collection centers. Call 1-800-424-9346 for a list of State Oil Recycling Contacts or write to Resource Conservation and Recovery docket; 401 M Street, SW., Washington DC 20460.



Used Oil Filters

Used oil filters require special handling. Those in automobiles and light-duty vehicles retain as much as 6 to 8 ounces of engine oil when they are removed. Despite the use of unleaded gasoline as a fuel, this residue contains toxics. Therefore, when improperly disposed of, both used oil and filters pose human health and environmental risks. The leftover oil should be drained from discarded filters prior to bringing them to a collection center for recycling.

A whole and completely drained oil filter and its components (i.e., filter casing, steel plate, rubber gasket, and filter paper media) can be recycled for the scrap metal or for energy value.

Recycling Used Coolant

Although old coolant is biodegradable, it may contain a number of environmentally harmful impurities such as lead. It is also poisonous. It is considered a hazardous waste.

So, don't dump old anti-freeze into a storm drain or sewer. Take it to a repair shop that has the equipment to remove the contaminants and replace the necessary additives. Usually, the recycled coolant will meet the standards for reuse in vehicle engines.

If, however, you flush out the cooling system yourself, be careful to catch all of the old antifreeze in a large clean container (you can use a hose and a reverse-flush kit to do this). When you've completely drained the coolant from the system, take it in a well-sealed container to a repair shop that has the right recycling equipment.

When draining the system, be especially careful because the anti-freeze's color, sweet smell and taste make it attractive to children and pets.

It is extremely poisonous so store the container out of reach of children and animals until you are ready to take it to the recycling station. If you spill any, be sure to flush it from the ground or floor so animals can't get at it.

Recycling Batteries

In 1986, lead acid batteries-like the one in your car-accounted for 138,000 tons, or 65 percent of the lead discards in municipal solid waste. As the number of cars on the road increases, so will the accumulation of used and discarded batteries. The typical car battery contains 18-20 pounds of lead-acid, a toxic substance that can cause serious adverse health effects if not disposed of properly.

Battery recycling, instead of disposal, is a significant way to limit environmental exposure to lead. Both the lead and the battery's plastic casing are recyclable. Consumers should take lead-acid batteries to dealers who will accept them and ship them to battery recycling centers. Or they can be left in

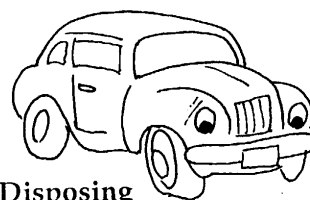
cars that are destined for automobile wreckers, who will generally take out the batteries and deliver them to scrap lead dealers, battery haulers, or battery manufacturers. From there they go to secondary smelters.

Thirty-four states and one city have already enacted legislation to promote lead-acid battery recycling. Most of these laws:

- Prohibit disposal of lead-acid batteries with municipal solid waste.
- Require retailers to accept used batteries from consumers when new ones are purchased.
- Require retailers to post notices informing consumers of state requirements.
- Compel battery manufacturers to accept used batteries from retailers when new ones are purchased.

Recycling Air-Conditioner Refrigerant

Automotive repair shops are now required to recycle refrigerant, so seek professional service if your air conditioner needs service or you plan to scrap your car. They must use special equipment to ensure that the refrigerant is properly collected and filtered for reuse. This will be especially important in the near future as the new supply of currently used freon diminishes but supplies are needed for older cars that haven't been or can't be converted to new refrigerants. For further information, call the Stratospheric Ozone Hotline: 1 800 296-1996.



Disposing of the Whole Car

There comes a time when even the most beloved old clunker must go. In fact, power companies and some states are encouraging people to turn them in for bonuses or other rewards in an effort to get high polluters and gasoline guzzlers off the roads once and for all.

Because almost every part of an automobile or truck is recyclable, the old car should not be abandoned in landfills or left to rust in a field or yard. It should be turned into a dealer as a trade-in destined for subsequent scrapping, or taken to a scrap dealer where it will be stripped of useable parts and the metals, glass, plastics, etc., will be separated and processed for recycling.

Finding a Good Automotive Repair Shop

Even if you are a do-it-yourselfer, there will be times when you need the services of a skilled technician for many jobs (like exchanging the air conditioning refrigerant), especially in this era of highly complex, computerized engines, transmissions, electrical systems and other parts of the vehicle. This does not mean that the small-town or crossroads service station technician you've been using can't do the job, but make sure he's had training and experience with the latest, more complicated vehicle components.

How do you find a reputable repair shop, if you don't already have one you're happy with? The non-profit National Institute for Automotive Service Excellence (ASE) suggests:

- Start shopping for a repair facility **before** you need one; you can make a better decision when you are not rushed.
- Ask friends and associates for their recommendations. Word-of-mouth reputation is valuable.
- Check out the shop with your local consumer protection organization.



- Look for a neat, well-organized shop, with vehicles in the parking lot equal in value to your own and modern equipment in the service bays.
- Ask about the qualifications of technicians. Look for evidence such as trade school diplomas, certificates of advanced course work, an American Automobile Association approval sign or certificates from various manufacturers. If all of the technicians do not have ASE certification or similar qualifications, ask who will be working on your car.
- Look for signs of professionalism in the customer service area, civic and community service awards, and the ASE sign, which indicates certified technicians.

- Professionally run establishments will have a courteous, helpful staff. The organization should be willing to answer **all** of your questions. Don't accept vague statements or promises.

- All policies (labor rates, guarantees, methods of payment, and so forth) should be posted and/or explained to your satisfaction.

- Ask if the shop customarily handles your vehicle make and model, and the type of repair you need. Some facilities specialize. Dealer service departments are up on the latest equipment and technologies in the vehicles they sell.

- Feel free to ask for the names of a few customers as references. Call them and ask specific questions for the type of repair your car needs. Ask if they were satisfied ... did the repair fix the problem...any hassles ... fair price ... would they go back?

- The local emissions inspection program may offer a list of repair shops and how successful they have been on cars that have not passed the smog check/emissions tests.

Driving for the Environment's Sake-A Quick Review

An environmentalist in the driver's seat saves money. Driving efficiently can save ten percent or more on fuel costs alone even if you don't reduce the number of miles you drive. If you drive less, you save even more. And what's more, driving efficiently is **safer** driving.

Here's a quick checklist of environmentally sound, fuel-efficient, emissions-reducing driving practices (for details, look inside this booklet):

- Use the right gasoline and oil (follow manufacturer's recommendations).
- Have all manufacturer's maintenance recommendations performed correctly.
- Limit warm-ups to 30 seconds.
- Minimize cold starts.
- Minimize idling (Idling = zero miles per gallon).

- Avoid waiting in lines at drive-ins where possible.
- Use (but don't abuse) 'right-turn-on-red.'
- Accelerate gently and steadily.
- Obey posted speed limits.
- Drive as much as possible at the most fuel efficient speeds--between 35 mph and 45 mph, except, of course, on beltways and interstate highways with higher speed limits.
- Use cruise control to maintain a steady speed when possible.
- Keep windows shut at high speeds.
- Minimize air conditioning use.
- Don't speed up only to have to brake quickly.
- Plan and combine your trips.
- Use other means of transportation.

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